



Contribution ID: 1388

Type: DM

Searching for light dark matter at Fermilab's proton-fixed target experiment: DarkQuest

Monday 24 May 2021 14:45 (15 minutes)

Accelerator-based searches for dark matter provide a unique opportunity to expand the search for particle dark matter to the sub-GeV mass regime.

In this region, there are exiting opportunities to search for dark sector signatures, mediators and the dark matter itself, that are unconstrained.

DarkQuest is a proton fixed-target experiment that would use a high-intensity beam of 120 GeV protons to produce dark sector mediators.

These mediators will interact feebly with the SM and decay into visible states with displaced lepton, photon and hadron decay signals.

DarkQuest will exploit the short baseline and compact spectrometer of the current beam dump experiment at Fermilab, SpinQuest, to search for these decays.

Because it builds on existing accelerator and detector infrastructure, it offers a powerful yet low-cost experimental initiative that can be realized on a short timescale.

In this talk we will discuss the current detector design, proposed upgrades and recent studies on the signal topology and the detector acceptance.

Summary

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Session Classification: DM VII